CLAIMS

1. A gene having a nucleotide sequence of a nucleic acid selected from the group consisting of:

(A) a nucleic acid encoding a polypeptide having the amino acid sequence of SEQ ID NO: 14 of the Sequence Listing or a partial sequence thereof, the polypeptide possessing a ceramidase activity;

(B) a nucleic acid having a nucleotide sequence of SEQ ID NO: 15 of the Sequence Listing or a partial sequence thereof and encoding a polypeptide possessing a ceramidase activity;

(C) anucleic acid encoding a polypeptide consisting of an amino acid sequence resulting from deletion, addition, insertion or substitution of at least one amino acid residue in the amino acid sequence of SEQ ID NO: 14 of the Sequence Listing, the polypeptide possessing a ceramidase activity;

(D) a nucleic acid consisting of a nucleotide sequence resulting from deletion, addition, insertion or substitution of at least one base in the nucleotide sequence of SEQ ID NO: 15 of the Sequence Listing and encoding a polypeptide possessing a ceramidase activity;

(E) a nucleic acid capable of hybridizing to a complementary strand of a nucleic acid of any one of the above (A) to (D), under stringent conditions, and encoding a polypeptide possessing a ceramidase activity; and

(F) a nucleic acid having a nucleotide sequence different from the nucleic acid of any one of above (A) to (E) via degeneracy and encoding a polypeptide possessing a ceramidase activity.

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2. The gene according to claim 1, wherein the ceramidase activity of the polypeptide is capable of being detected by the following steps:

(a) incubating a gene expression product in a reaction mixture [composition: 550 pmol of C12-NBD-ceramide and 1.0% (W/V) sodium cholate in 20 µl of 25 mM Tris-hydrochloric acid buffer (pH 7.5)] at 37°C for 30 minutes, to react the mixture; and

(b) detecting generation of a C12-NBD-fatty acid in the reaction product.

3. The gene according to claim 1 or 2, wherein the polypeptide exhibits at least the following characteristics:

(i) action: hydrolyzing ceramide, to generate sphingoid and a fatty acid;

(ii) substrate specificity: hydrolyzing N-acylsphingosine; but not acting on galactosylceramide, sulfatide, GM1a, and sphingomyelin;

(iii) optimum pH: being from 7.0 to 8.0; and

(iv) lowering of the activity not being found when treated in 20 mM Tris-hydrochloric acid (pH 7.5) containing 0.1% polidocanol at 37°C for 24 hours, but the activity lowering by a treatment at 60°C for 1 hour to about 30% of the activity before the treatment.

4. A recombinant DNA comprising the gene of any one of claims 1 to 3.

5. An expression vector for a microorganism, an animal cell or a plant cell, comprising the gene of any one of claims 1 to 3 or the recombinant DNA of claim 4.

6. A transformant carrying the expression vector of claim 5.

7. A method for producing a polypeptide possessing a ceramidase activity, characterized by culturing the transformant of claim 6 under conditions appropriate for expression of the ceramidase gene and production of the polypeptide encoded by the gene, and collecting a polypeptide possessing a ceramidase activity from the resulting culture.

8. A polypeptide having the amino acid sequence of SEQ ID NO: 14 of the Sequence Listing or a partial sequence thereof and possessing a ceramidase activity.

9. A polypeptide possessing a ceramidase activity, encoded by the gene of any one of claims 1 to 3.

10. The polypeptide according to claim 8 or 9, wherein the ceramidase activity is capable of being detected by the following steps:

(a) incubating a gene expression product in a reaction mixture [composition: 550 pmol of C12-NBD-ceramide and 1.0% (W/V) sodium cholate in 20 µl of 25 mM Tris-hydrochloric acid buffer (pH 7.5)] at 37°C for 30 minutes, to react the mixture; and

(b) detecting generation of a C12-NBD-fatty acid in the reaction product.

11. An antisense DNA which is complementary to the gene of any one of claims 1 to 3 or a part thereof.

12. An antisense RNA which is complementary to the gene of any one of claims 1 to 3 or a part thereof.

13. An expression vector comprising the antisense DNA of claim 11.

14. An oligonucleotide probe or primer, capable of specifically hybridizing to the gene of any one of claims 1 to 3 or a complementary strand thereof.

15. An antibody or a fragment thereof, capable of specifically binding to the polypeptide of any one of claims 8 to 10.

16. A method for detecting a gene encoding a polypeptide possessing a ceramidase activity, comprising using the oligonucleotide probe or primer of claim 14.

17. A kit for the use in detection of a gene encoding a polypeptide possessing a ceramidase activity, comprising the oligonucleotide probe and/or primer of claim 14.

18. A method for detecting a polypeptide possessing a ceramidase activity, comprising using the antibody or a fragment thereof of claim 15.

19. A kit for the use in detection of a polypeptide possessing a ceramidase activity, comprising the antibody or a fragment thereof of claim 15.

Sub a4

20. A method of controlling an amount of ceramide in a cell and/or in a tissue, characterized by introducing the gene of any one of claims 1 to 3 or an antisense nucleic acid thereof into the cell and/or the tissue, thereby controlling the amount of ceramide in the cell and/or in the tissue.

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